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Short Communication

POTENTIAL THERAPEUTIC ACTIONS OF THE EASTERN NIGERIAN MISTLETOES

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ABSTRACT

In our efforts to provide comparative **s**cientific data supporting the medicinal cum potential therapeutic and putative clinical applications of the Eastern Nigeria mistletoes (*Loranthus micranthus* (Linn) or *Tapinanthus globiferus* (A. Rich). Together, we successfully investigated and documented several biological activities of this species of mistletoes. Besides, several preparations mostly decoctions from teas of mistletoes are available in Nigerian drug markets which demand scientific documentation of supporting evidence, including safety profile for their continued use and subsequent approval in Nigeria and beyond. Documented data and biological activities of the Eastern Nigeria mistletoes include: preliminary phytochemical, anti-diabetic, toxicology, immunomodulatory, immuno-adjuvanting, lectin-like, antimicrobial (anti-tuberculosis), anti-inflammatory, antitumour, osteogenic and antioxidant properties. In all, efforts were targeted at establishing the exactness of the structural chemical principles responsible for each identified activity. We herein report the summary of findings with respect to these investigated biological activities of the Eastern Nigeria mistletoes.

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INTRODUCTION

Natural biodiversity remains an unmatched, incontrovertible and reliable sources for bioactive as well as bio-compatible chemical entities for drug discovery and development. Processed either as pure compounds, fractions or whole plant extracts, natural products have consistently provided potent molecules for effective treatment and mitigation of disease burdens of man and animal [1]. In recent times, there is a phenomenal surge in the use of medicinal plant products as well as research interest in them to generate potent bioactive molecules necessary for health enhancement [2]. Of the several plant species so far explored scientifically, a unique semi-parasitic plant, mistletoe found growing on diverse host trees across different continents appears quite interesting and promising with regards to drug development. European mistletoe has been used for centuries in traditional medicine for a variety of conditions, including seizures, headaches, and menopause symptoms [3-5]. Today, European mistletoe has gained clinical relevance backed up by scientific data and is promoted as an official treatment for cancer. In Germany, there is the German Mistletoe Society that holds conference/symposium every four (4) years to discuss cutting-edge clinical research findings and applications of mistletoes with special interest in tumour management. Mistletoes of different genera and species grow on different host trees across the six (6) geopolitical zones in Nigeria with diverse botanical names such as *Loranthus micranthus (*Linn) or *Tapinanthus globiferus* (A. Rich). Tiegh. The Eastern Nigeria mistletoe, *Loranthus micranthus (*Linn) or *Tapinanthus globiferus* (A. Rich). Tiegh, has been employed traditionally in management of various ailments, notably, oxidative stress [6], inflammation [7-9], diabetes [10-14], high blood pressure and conditions affecting human immune system for past several decades [15]. Aqueous decoctions or alcoholic extracts of *Loranthus micranthus* have diverse folkloric claims of effectiveness for treatment of epilepsy, diabetes [10-14], hypertension, cardiovascular diseases [15], menopausal syndrome and osteoporosis [16-19], infertility, rheumatism, microbial infections, intestinal spasms, agglutination and in conditions generally requiring modulation of the immune system [20-37]. Contrary to the well-studied and properly documented European specie of mistletoes, *Viscum album,* there is apparent lack of data on mistletoe species found in the South-Eastern Nigeria region [3-5]. Consequently, we report herein, in this communication, the established biological activities of the Eastern Nigeria mistletoes

METHODOLOGY

All experiments for the aforementioned biological activities were conducted following standard designs with appropriate test statistics. Results were recorded as mean values of at least triplicate measurements with standard error or deviation values. *In-vitro*, *ex-vivo,* or whole animal experiments were done strictly with ethical approvals and in line with best global practices in research and documentation. Results obtained were interpreted and discussed relative to existing similar data on mistletoes from other continents or where the findings are uniquely novel, as a function of established basic mechanisms of biological activities being evaluated. In all, the obtained data on biological activities of the eastern Nigeria mistletoes were disseminated in dissertations, thesis, technical reports, conference poster abstracts and proceedings, oral presentations or high impact journals. Most of the researches were executed with grants, fellowships or scholarships at local, national, regional and international levels.

RESULTS

The eastern Nigeria mistletoes have been established as safe following acute, sub-acute and chronic administration to experimental rodents or cell cultures. Till date, we have published over twenty-two (22) journal articles, twenty-five (25) conference proceedings and obtained one (1) major patent describing the potent anti-tuberculosis and antitumor potentials of some novel gallic acid derivatives present in the eastern Nigeria mistletoes. The eastern Nigeria mistletoes are heavily rich in phytochemical metabolites especially, polyphenolics and flavonoids, alkaloids, proteins, lectins, steroids, terpenoids, saponins and other glycosides of diverse classes, amino acids, peptides, carbohydrates, chlorophyll and other pigments, β-carotenes, xanthenes, tannins, gallates and numerous derivatives, fatty acids/oils, etc. In terms of structural elucidation, we have successfully isolated and characterized over seventy (70) chemical compounds of diverse classes and analogues from mistletoes parasitizing diverse host trees in eastern Nigeria. The measured biological activities were found to be influenced by the host tree, seasonal and ecological variations. Mistletoes parasitic on *Kola acuminata* (kola nut tree) or *Garcinia*

kola (bitter kola tree) were found to be uniquely potent in most measured activities. In some cases, the particular chemical constituent(s) responsible for the observed biological activity were unambiguously established. The eastern Nigeria mistletoes are potently antidiabetic in action, immunostimulatory and have potentials of boosting the immune system. They show high antioxidant potentials and strong anti-inflammatory activity. The mistletoe species possess moderate to high antimicrobial activity especially against resistant *Mycobacterium*. The observed strong immunotherapeutic adjuvanting property of the eastern Nigeria mistletoes is shown to be due to the presence of yet to be characterized glycoproteins (lectins) [15].

CONCLUSION

In view of the established experimental data, the eastern Nigeria mistletoes possess several biological properties that render them potential components of the clinical armamentarium against diseases and vectors of diverse origin.

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AUTHORS' CONTRIBUTION

EOO is the corresponding author and executed most of the research works including writing the manuscript; COA reviewed part of the manuscript, ICU, MOA, WOO, DO, JU, PA, LO, POO designed and executed some of the reported research works, JNN, PFU, SCN reviewed parts of the design while CN, AK, PP provided laboratory supports to EOO. In particular, AK provided substantial support for the purification of isolated compounds in CUNNY, USA as well as strong guidance in the spectral analysis of the compounds.

CONFLICT OF INTEREST

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

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